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THE
ONTARIO WATER RESOURCES
COMMISSION
WATER POLLUTION SURVEY
OF THE
NAPANEE RIVER

May, 1965

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Report
on a
WATER POLLUTION SURVEY
of the
NAPANEE RIVER

Division of Sanitary Engineering

May 1965

WATER POLLUTION SURVEY

of the

NAPANEE RIVER

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INTRODUCTION

A water pollution survey of the Napanee River was performed on June 3, and 4, 1964. Subsequent investigations were made on October 3, 1964 at which time additional samples were collected. Samples were collected from the Napanee River as well as private, municipal, and industrial outfalls discharging to it. During the latter part of the summer, the Napanee River was sampled periodically from the Town of Napanee to the river mouth by the local sewage treatment plant operator, Mr. W. Clark.

Surveys of this type are made by the Ontario Water Resources Commission for the purpose of locating and recording sources of existing and potential water pollution. Recommendations pertaining to the abatement of these sources are made to the parties concerned.

It is noted that the comments in this report pertain to conditions as they existed at the time of the survey.

PREVIOUS SURVEYS

A similar survey was performed in 1961. Within the Town of Napanee, flows of an unsatisfactory sanitary chemical quality were discharging to the river from four municipal storm sewers. Concentrations of phenol were noted downstream of the Strathcona Paper Company Limited plant but were within the Commission's acceptable limit. It was also noted that untreated industrial wastes were being discharged from the Newburgh Milk Products Limited plant to a tributary of the Napanee River. A minor survey was effected during 1962. A survey made in 1963 revealed high coliform counts downstream of the Town of Napanee, and the communities of Strathcona and Yarker. Phenol concentrations were noted downstream of the community of Strathcona.

PERSONS CONTACTED

Unsuccessful attempts were made to contact Mr. M. C. Graham, Municipal Clerk, Town of Napanee on June 3rd and October 7th. A discussion was held with Mr. J. J. Marshall, Clerk, Village of Newburgh. Valuable assistance was received from Mr. T. Powell, Works Superintendent of the Napanee Works Department, and from Mr. W. J. Clark, Sewage Treatment Plant Operator.

NAPANEE RIVER WATERSHED

The Napanee River Watershed covers an area of approximately 316.3 square miles. The sources of the Napanee River, Depot Creek, Hardwood Creek, and Cameron Creek all flow into Napanee Lake. From Napanee Lake the Napanee River flows to its mouth at the Bay of Quinte. A large marsh area known as the Cameron Swamp, covering approximately 8,000 acres, lies in the northern part of the watershed. Flows from numerous tributary streams are collected in the swamp, which in turn discharges to the main watercourse. From the Cameron Swamp to the Town of Napanee, the main watercourse drops approximately 200 feet or 12.5 feet per mile.

The rusty colour of the Napanee River water may be attributed to the minerology of the bedrock in the northern reaches of the watercourse and to the large marsh area.

MUNICIPALITIES

The following municipalities lie either wholly or partially within the Napanee River Watershed.

County of Lennox and Addington

Town of Napanee
Village of Newburgh
Township of Camden
Township of Ernestown
Township of Fredericksburgh North

Township of Richmond
Township of Sheffield

County of Frontenac

Township of Bedford
Township of Hinchinbrooke
Township of Kennebec
Township of Loughborough
Township of Portland

Within the County of Lennox and Addington, the incorporated centres in the Napanee Watershed which may be considered of major size are the Town of Napanee and the Village of Newburgh. Smaller communities lying in this watershed include Yarker, Camden East, Verona, Enterprise, Moscow, Strathcona, Bellrock and Centreville.

THE TOWN OF NAPANEE

General

The Town of Napanee is located on the shores of the Napanee River approximately six miles above its mouth. According to the 1964 Municipal Directory the assessed population is 4,404.

Drainage

Drainage for the town is provided by the Napanee River.

Water Supply

Water is drawn from the Napanee River and is provided by the municipal water works system. Treatment consists of settling, coagulation, filtration and chlorination. The design capacity of the treatment plant is approximately 2.5 million gallons per day.

Sewer System

Separate sewer systems are utilized. Sanitary wastes are conducted by the sanitary sewer system to the sewage treatment plant. The storm sewers discharge mainly to the Napanee River or to ditches leading to the river.

Sewage Treatment Facilities

The primary sewage treatment plant has a design capacity of 750,000 gallons per day. The outfall from this plant is submerged in the Napanee River approximately 300 feet from the shore. No chlorination of the effluent is provided. The following is a summary of sample results for 1963 and part of 1964.

<u>Date</u>	<u>Raw</u>	<u>5-Day BOD</u>	<u>Efficiency</u>	<u>Suspended Solids</u>		
		<u>Effluent</u>		<u>Raw</u>	<u>Effluent</u>	<u>Efficiency</u>
*Jan. 9/63	74	40	46%	92	56	43%
*April 2/63	19	11	42%	24	13	46%
May 21/63	44	12	73%	68	19	72%
July 11/63	340	100	71%	769	94	88%
Oct. 8/63	70	50	29%	80	39	54%
Jan. 8/64	140	26	81%	91	16	82%
*Feb. 19/64	92	47	49%	104	60	42%

* denotes grab samples. The remainder are eight-hour composite samples.

Industry

The following principal industries are located within the Town of Napanee.

<u>Name of Firm</u>	<u>Product</u>
Gibbard Furniture	Furniture
Napanee Industries	Boilers and Hoists
Nabisco Foods	Pet foods
Pet Milk	Powdered Milk

Refuse Disposal Site

The refuse disposal site is located on the west bank of the Napanee River just north of the sewage treatment plant. For several years, refuse has been placed in this area, resulting in considerable land being reclaimed from the watercourse.

Accumulations of debris and refuse have been allowed to gain access to the watercourse.

A number of inspections of this site by Commission staff has resulted in recommendations being made for either a revision of the waste disposal procedures or the selection of a more suitable area.

WATER USES

Municipal Use

The only instance of municipal use of the Napanee River is the Town of Napanee which uses it as the source of municipal water supply and the receiving water for the sewage treatment plant effluent.

Industrial Use

The Strathcona Paper Company Limited plant at Strathcona employs the Napanee River waters for industrial purposes. The disposal of industrial wastes therefrom is effected by the use of waste stabilization ponds and spray irrigation. During this investigation a heavy rainfall occurred resulting in a discharge from a lagoon as well as the spray area to the river. This firm has extended considerable effort in the past to provide an effective method of industrial waste disposal.

A portion of the wastes from the Newburgh Milk Products plant at Newburgh is discharged to a tributary of the Napanee River.

Agricultural Use

Some use is made of the river for the watering of cattle.

Recreational Use

Minimal use may be made of the Napanee River for recreational purposes.

SAMPLING PROCEDURE

Samples were collected from the Napanee River and from evident discharges to the watercourse. Bacteriological examination and sanitary chemical analysis were performed at the OWRC laboratory in Toronto. The sample results are recorded in the appendix to this report. Two maps, one of the Town of Napanee and one of the Napanee River Watershed, are also appended.

INTERPRETATION AND SIGNIFICANCE OF LABORATORY RESULTS

The analyses employed in this investigation to assess the quality of outfall discharges and surface waters were: biochemical oxygen demand (BOD), suspended solids, the total coliform count, as well as other specific tests.

The BOD of sewage, industrial wastes, or polluted waters is the oxygen required during stabilization of the decomposable organic or chemical material by aerobic biochemical action. The 5-day BOD determination with incubation at 20 degrees Centigrade is reported. A high BOD is indicative of organic or chemical pollution. The desirable upper limit in surface water is four (4) parts per million (ppm).

Suspended solids are reported in parts per million and indicate the measure of undissolved solids of organic or inorganic nature.

The total coliform count is employed to obtain an enumeration of coliform organisms, and the number is reported per 100 millilitres (ml) of the sample. The Membrane Filter technique was used in the examination of these samples. The maximum limit of 2400 coliform organisms per 100 ml is the OWRC objective for

the bacteriological quality of surface water in Ontario.

Additional specific analyses were performed, where deemed necessary to evaluate other aspects of water quality. Some of these analyses include the tests for the presence of phenol, as well as pH values.

Below are listed some of the pertinent maximum allowable concentration limits of contaminants in storm sewers, sewage treatment plant and industrial waste discharges. Adequate protection for surface waters except in certain specific instances, influenced by local conditions, should be provided if the following concentrations and pH range are not exceeded.

5-day BOD	-	15 ppm
Suspended solids	-	15 ppm
Phenol	-	20 ppb
Iron	-	17 ppm
Oil (ether solubles)	-	15 ppm
pH range	-	5.5 to 10.6

SAMPLE RESULTS

Basically similar conditions to those noted in the 1961 and 1963 surveys are apparent from the sample results. Satisfactory results were obtained in the upper reaches of the Napanee River. Coliform counts increased below the Village of Newburgh, Community of Strathcona, and the Town of Napanee. Considerably high coliform counts were noted opposite the Napanee refuse disposal site and the Napanee sewage treatment plant outfall. Concentrations of phenol were revealed in the river downstream of the Strathcona Paper Company Limited plant.

A high coliform count was obtained in the discharge from the drainage ditch from Dairy Avenue taken on June 4. On October 3, no flow was noted in this ditch.

POLLUTION SOURCES

On the basis of the sample results, the following sources of pollution are indicated. Excessive BOD and coliform contents were noted in the discharge from four municipal storm sewers in the Town of Napanee. It is noted that there was no appreciable flow in the Richard Street and Centre Street storm sewers. Samples were collected from still water lying in the manholes. These results are interpreted with this in mind.

The sewage treatment plant influent and effluent results indicate a wide range in plant efficiency. The expected degree of efficiency for a primary treatment plant such as this is 60 per cent efficiency for suspended solids removal and 35 per cent efficiency of BOD reduction.

The excessive coliform counts obtained opposite the Napanee refuse disposal site are in all likelihood due to seepage from the fill area.

Phenol concentrations noted downstream of the Strathcona Paper Company Limited plant are attributed to the escape of waste to the river from the lagoons and also from run-off from the spray irrigation area.

Untreated wash water and milk spillages are discharged from the Newburgh Milk Products plant to a tributary of the Napanee River.

SUMMARY

A water pollution survey of the Napanee River was performed in June and October of 1964. Basically similar conditions to those indicated in previous surveys were noted.

RECOMMENDATIONS

1. The Town of Napanee should pursue an active programme to exclude inadequately treated wastes from the municipal storm sewers.

2. Efforts should be continued at the Napanee sewage treatment plant to provide adequate waste treatment. Chlorination of the plant effluent would provide assistance in attaining this.

3. Efforts should be made to prevent any seepage to the watercourse from the Napanee refuse disposal site. This may be accomplished by the construction of a suitable dyke or retaining wall. The acquisition of another site where the refuse could not gain access to a watercourse is desirable.

4. The Strathcona Paper Company Limited should continue with its efforts to provide effective methods of industrial waste treatment.


5. The Newburgh Milk Products Limited should revise its methods of industrial waste disposal to protect the quality of the local watercourse.

All of which is respectfully submitted,

District Engineer:


J. K. Theil

Approved by:


K. H. Sharpe, Director

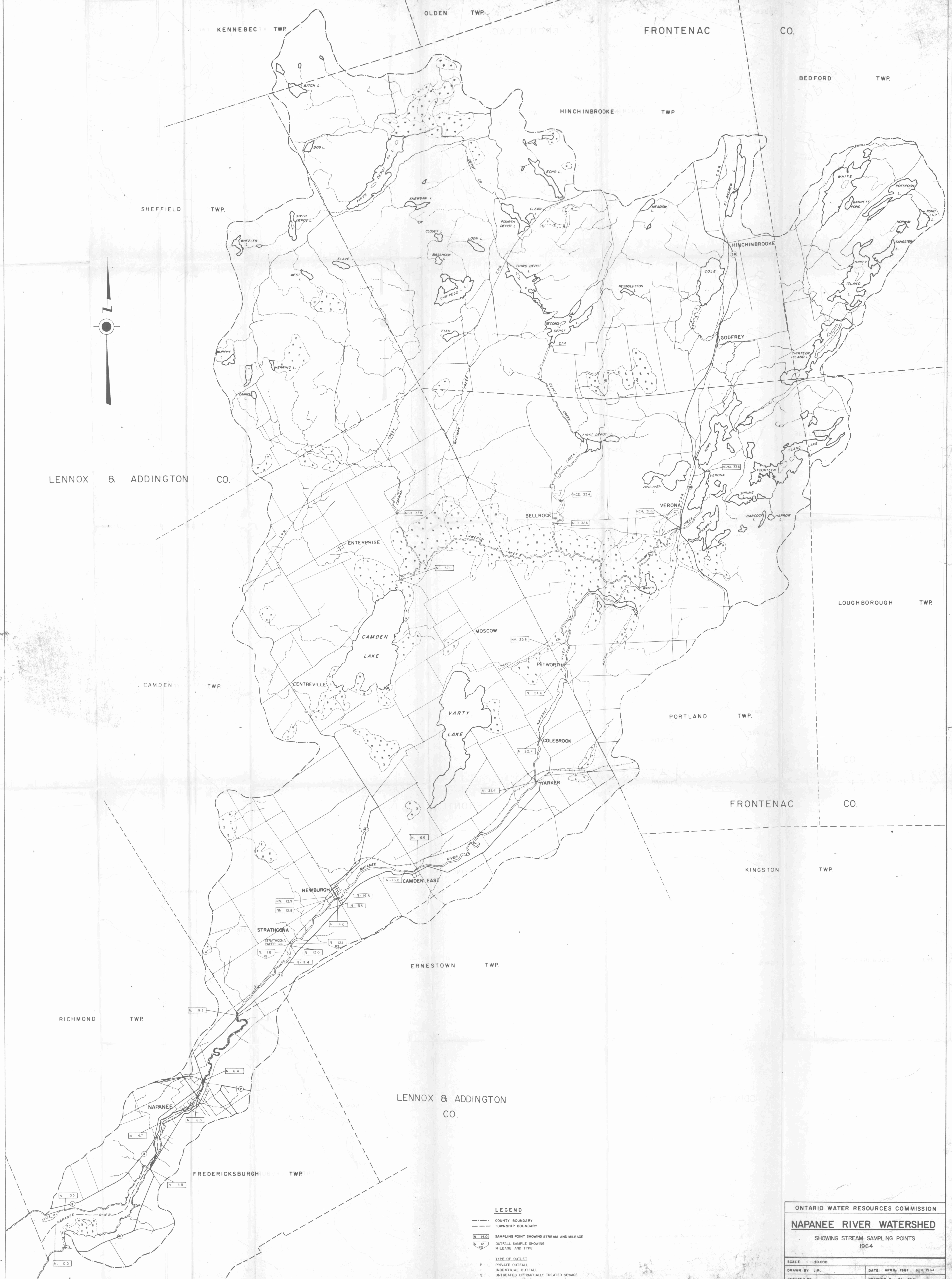
Prepared by: M. Holy

/mh

NAPANEE RIVER
WATER POLLUTION SURVEY

SAMPLE POINT No.	DATE	DESCRIPTION OF SAMPLING POINTS	5-DAY	S O L I D S			TOTAL COLIFORMS PER 100 ML
			BOD	TOTAL	SUSP.	DISS.	
N. 0.0	JUNE 3	NAPANEE RIVER AT BAY OF QUINTE	1.8	214	15	199	10
	AUG. 25		2.6	250	28	222	
	SEPT. 28		3.0	200	15	185	
N. 0.5	JUNE 3	NAPANEE RIVER $\frac{1}{2}$ MILE ABOVE BAY	2.0	206	19	187	0
N. 2.0	JUNE 3	NAPANEE RIVER AT BEGINNING OF NARROWS	2.9	254	26	228	310
N. 3.5	JUNE 3	NAPANEE RIVER NEAR HWY. 41 - 2 MILES BELOW NAPANEE	2.1	228	12	216	41,000
	AUG. 25		2.9	234	18	216	
	SEPT. 28		1.9	242	13	229	90
N. 4.7	JUNE 3	NAPANEE RIVER 1 MILE BELOW NAPANEE - AT POWER LINE CROSSING	1.7	246	10	236	12,000
	AUG. 25		2.2	264	10	254	1,200
	SEPT. 28		1.0	200	9	191	460
N. 5.4	JUNE 3	NAPANEE RIVER NEAR NAPANEE STP OUTFALL	1.3	224	8	216	33,000
	AUG. 25		2.1	230	8	222	9,400
	SEPT. 28		1.9	206	6	200	28,000
N. 5.4 T		NAPANEE STP OUTFALL					
N. 5.5	JUNE 3	NAPANEE RIVER OPPOSITE NAPANEE REFUSE DISPOSAL SITE	1.1	200	3	203	29,000
	JUNE 4		3.4	272	24	248	710,000
N. 5.5 R	JUNE 3	RELIEF OUTFALL FROM NAPIER ST. SEWAGE PUMPING STATION	N O F L O W				
	OCT. 7		N O F L O W				
N. 5.7 W	OCT. 7	STORM SEWER WHICH DISCHARGES TO NAPANEE R. AT FOOT OF RICHARD ST.	1.7	354	80	274	780,000
N. 5.8 D	JUNE 3	STORM SEWER OUTFALL TO DITCH AT THE FOOT OF ROBINSON ST.	1.4	474	10	464	22,000
	OCT. 7	(SAMPLE TAKEN FROM MANHOLE)	130.	1076	542	534	1,070,000
N. 6.0	JUNE 3	NAPANEE RIVER AT CENTRE ST. BRIDGE AT NAPANEE	1.2	202	8	194	750
	AUG. 25		1.4	210	4	206	750
	SEPT. 28		0.8	186	2	184	25,000
N. 6.0 W-1	OCT. 7	STORM SEWER WHICH DISCHARGES TO THE NAPANEE R. AT THE FOOT OF CENTRE STREET	13	302	23	279	400,000
N. 6.0 W-2	OCT. 7	STORM SEWER WHICH DISCHARGES TO THE SOUTH BANK OF THE NAPANEE RIVER AT CENTRE ST. BRIDGE	360	2048	334	1714	189,000,000
N. 6.1 -W		STORM SEWER WHICH DISCHARGES TO THE NAPANEE R. AT THE FOOT OF EAST ST.	N O F L O W				
N. 6.3 -W		STORM SEWER OUTFALL JUST BELOW C.N.R. BRIDGE	N O F L O W				
N. 6.4	JUNE 4	NAPANEE RIVER AT BRIDGE JUST NORTH-EAST OF NAPANEE ON ROAD TO NEWBURGH. PHENOLS IN PPB - 10. PH AT LAB. - 7.9	0.8	222	7	215	5,900
N. 6.5 D	JUNE 4	DRAINAGE DITCH TO RIVER FROM DAIRY AVE.	3.2	262	24	238	82,000
N. 9.3	JUNE 4	NAPANEE RIVER AT BRIDGE $2\frac{1}{2}$ MILES ABOVE NAPANEE ON NEWBURGH RD. PHENOLS IN PPB - 8. PH AT LAB. - 8.1	0.2	202	5	197	7,700

SAMPLE POINT NO.	DATE	DESCRIPTION OF SAMPLING POINTS	5-DAY	S O L I D S			TOTAL COLIFORMS
			BOD	TOTAL	SUSP.	DISS.	PER 100 ML
N. 11.5 !	JUNE 4	OUTFALL FROM STRATHCONA PAPER CO. - FINAL LAGOON TO NAPANEE R. PHENOLS IN PPB - 40 PH AT LAB. - 7.2	46	475	64	412	8,000
N. 12.0	JUNE 4	NAPANEE RIVER AT STRATHCONA SIDE ROAD	0.7	204	5	199	14,700
	OCT. 7		3.1	142	11	131	490
N.N. 13.8	JUNE 4	TRIBUTARY OF NAPANEE RIVER DOWNSTREAM FROM NEWBURGH MILK PRODUCTS OUTFALL	660	1258	422	836	107,000,000
N.N. 13.9	JUNE 4	TRIBUTARY OF NAPANEE RIVER UPSTREAM FROM NEWBURGH MILK PRODUCTS OUTFALL	1.1	628	41	587	2,200
N. 14.0	JUNE 4	NAPANEE RIVER AT BRIDGE AT NEWBURGH	0.6	200	2	198	1,100
N. 16.4	JUNE 4	NAPANEE RIVER AT BRIDGE AT CAMDEN EAST	0.9	194	1	193	38
N. 21.4	JUNE 4	NAPANEE RIVER AT BRIDGE AT YARKER	0.7	166	1	165	38
N. 22.4	JUNE 4	NAPANEE RIVER AT BRIDGE AT COLEBROOK	1.1	196	2	194	30
N. 24.6	JUNE 4	NAPANEE RIVER AT BRIDGE AT PETWORTH	0.8	196	0	196	24
N.V. 25.8	JUNE 4	VARTY CREEK AT PETWORTH ROAD					
N.C.H. 31.6	JUNE 4	HARDWOOD CREEK AT ROAD $\frac{1}{2}$ MILE SOUTH OF VERONA	1.3	160	1	159	38
N.C.D. 32.6	JUNE 4	DEPOT CREEK AT BRIDGE JUST BELOW BEDROCK	1.0	110	1	109	24
N.D. 33.4	JUNE 4	DEPOT CREEK AT ROAD BRIDGE $\frac{1}{3}$ MILE ABOVE BEDROCK					35
N.C.R. 37.8	JUNE 4	CARMAN CREEK AT ROAD NORTH-EAST OF ENTERPRISE					6
N.C. 37.0	JUNE 4	CAMERON CREEK AT ROAD $\frac{1}{4}$ MILE NORTH OF CAMDEN LAKE					43



LEGEND

- COUNTY BOUNDARY
- TOWNSHIP BOUNDARY
- N-14.0 SAMPLING POINT SHOWING STREAM AND MILEAGE
- N-14.1 OUTFALL SAMPLE SHOWING MILEAGE AND TYPE
- TYPE OF OUTFALL
 - P PRIVATE OUTFALL
 - I INDUSTRIAL OUTFALL
 - S UNTREATED OR PARTIALLY TREATED SEWAGE

ONTARIO WATER RESOURCES COMMISSION

NAPANEE RIVER WATERSHED

SHOWING STREAM SAMPLING POINTS 1964

SCALE: 1" = 50,000'

DRAWN BY: J.R. DATE: APRIL 1964 REV: 1964

CHECKED BY: DRAWING NO: 61-23B

TOWNSHIP OF RICHMOND

ROAD ALLOWANCE BETWEEN CONS. II & III



LEGEND:

- N-5-5 - STREAM SAMPLING POINTS SHOWING STREAM AND MILEAGE
- N-6-0 - OUTLET SAMPLE SHOWING MILEAGE AND TYPE
- TOWN LIMITS

TYPE OF OUTLET

- W - WATER (STORM SEWER)
- D - DITCH
- T - SEWAGE TREATMENT PLANT
- R - RELIEF SEWER

ONTARIO WATER RESOURCES COMMISSION

TOWN OF NAPANEE WATER POLLUTION SURVEY 1964

SCALE

250' 0 250' 500' 1000'

DRAWN BY: J. H.

DATE: MARCH, 1961 REV. 1964

CHECKED BY:

DRAWING NO: 61-20 A